Mell, Clayton D.
A report on the timber tract of the Bayano Rivers...

A REPORT ON THE TIMBER TRACT
OF
THE BAYANO RIVER LUMBER COMPANY
IN
THE PROVINCE OF PANAMA

R. P.

by

C. D. MELL

Object of the Report

Following the verbal instructions from Mrs. C. Wilson and having received from Mr. Geo. Burnham, Jr., a letter of introduction to Mr. Eric Barham, the local representative of the Bayano River Lumber Company, Panama City, the writer left New York on November 24 by the S. S. Panama for Cristobal, C. Z., with an object of making a general investigation of the forest property and of studying the conditions determining the feasibility of resuming lumbering operations on their Bayano property. This forest reconnoissance had also for its primary object not only an inquiry as to the kinds, qualities, quantities, and uses of the woods available on the property, but also a true exposition dealing with the possibility of successfully introducing these woods into the American markets in compitition with other and better-known kinds. The field included also a study of the suitability of the cleared land for agricultural enterprises on a large scale.

Extent of the Field Work

The writer left Panama City on December 6 on a chartered gasoline launch for the Bayano River property and arrived at the tract in the afternoon of the same day. Arrangements

were made immediately with the caretaker and four other local men to traverse the property in different directions so as to afford the best possible view of the general topography and the forest conditions. The courses taken during the six days of continuous travel and observations are indicated in red ink on t the accompanying map. After concluding all necessary field work on the evening of December 14 the return trip was made on a small sailing vessel(dugout) which reached Panama City on December 15, and the writer finally arrived in New York on December 27 on the S. S. Cristobal.

Location of the Property

The property is located on the Pacific side of the Continental Divide and within the Province of Panama of the Republic of Panama. It is reached by boat going almost due east from Panama City for 39 miles on the Bay of Panama to the mouth of the Bayano(Chepo) river, which flows southward draining a large part of the Province of Panama and all of the Company's ho holdings. About 12 miles up the Bayano river the Culebra river flowing westward marks the southern boundary of the tract which extends along the Bayano river as far as the Bolano river which forms a part of the northern boundary. The tract is said to extend eastward from the left bank of the Bayano river for a distance of 15 or 20 miles.

Area of the Tract

Although the boundaries of the tract are defined in the original description of the property, no survey figures are extant by means of which the area may be computed accurately. While conservative estimates indicate that the area is approximately 115,000 acres, there are those who claim that the tract is much larger in extent. However, the distance from the mouth of

the Culebra river to that of the Belano is not over six miles, and since the distance from the Bayano to the extreme eastern boundary of the property may be traversed by foot in one day, it can not be much over 20 miles long. Assuming then that the general outline of the property is roughly rectangular as shown by the map, it is entirely possible that the area does not exceed 120 square miles, or about 75,000 acres. It may be, therefore, that the tract is much smaller than what is generally believed.

Surface Configuration

The area covered by the Comapny's holdings is within the State of Chiapas the foot hills of the poorly defined ~~Central~~ eastern Cordillera, and, as in all other parts of ~~Panama~~ southern Mexico, the hills and mountains are scattered about without any apparent law or order. While it may be said that the general trend of the hills ~~parallels~~ extend east and west the numerous streams within the property ~~drain-ing the property and flowing from east to west~~ and draining the area into the ~~Bayano~~ Chocolá which bounds the property on the east side, the streams themselves are ~~so~~ as tributary meandering ~~as to make it difficult at times to follow them.~~ There ~~is an area of about 8,000 acres called Bajo Grande between the Culebra and the Colubre rivers that~~ is fairly level, but even ~~this~~ is broken up by numerous ravines and small hills; the ~~balance~~ rest of the ~~tract~~ area is rendered very undulating by ~~the~~ numerous elevations ~~that~~ which are from 100 to ~~500~~ 500 feet or more above the water of the lowlands ~~high.~~ The slopes are often very steep which during the rainy season are subject to excessive erosion. The property is, therefore, located outside of the region suitable for general agricultural development, for the reason that clearings made in such hilly country for purposes other than that for the growing of grasses which hold the soil together, would cause very destructive erosion during the season of heavy rainfall.

The entire area is of a relatively recent geological sea-bottom uplift, and the natural agencies are now operating in wearing down

the surface normally. To deforest these slopes and ridges now and to attempt to cultivate them would probably result very disasterously and the outlay or investment involved would result in a total loss.

Drainage

As ~~already~~ outlined, the ~~Bayano~~ river forms the ~~western~~ boundary of the tract. ~~The river here~~ is about 200 feet wide during the dry season and ~~between~~ four and ~~six~~ feet deep. ~~at low tide.~~ ~~At high tide~~ the water ~~is from 10 to 12 feet deep and during flood tide (twice each month) it may be as much as 17 feet deep.~~ The banks of the river are steep, often 20 feet high, ~~which during the height of the rainy season overflow,~~ though there is practically no low land on the property ~~along the Bayano river to overflow.~~ Immediately back from the river the surface assumes the irregular character ~~except in parts along the~~ smaller ~~streams~~ draining into ~~the Bayano from the property.~~ The ~~principal~~ streams ~~through the tract from the east are the~~ Culebra, Bajo Grande, Trapeche, Colubra, ~~and the Balano.~~ These ~~are all tidal streams for only a short distance in, and beyond the points where the tide stops~~ the stream ~~beds become dry almost immediately after the end of the rainy season which is about December 15.~~ The entire interior part of the tract ~~becomes excessively dry during the rainless season, and no industry can be carried on unless water is artificially supplied from the Bayano river. There are no settlers located away from the banks of the Bayano, because of the entire lack of water during the dry season.~~

Soil Conditions

The soil is ~~of a sandy loam~~ which resulted from the disintegration of the ~~sandy rock~~ that is observed in the form of out crops on the upper slopes and ridges of the highest hills. ~~In the~~

southern ~~end~~ boundary of the property along the ~~Tuhcibra~~ chocolja river ~~rocks are rarely visible even in the deepest ravines~~ the surface is, in fact, exceedingly rocky often making travel very difficult; farther to the north and particularly ~~at the source of the Balano~~ along the Chocolja river the stream beds are in many places solid rock and often stratified and of an ~~arenaceous~~ lime stone similar to that of many of the petroliferous regions in other parts of Central America, Mexico and ~~Venezuela. Within the same region~~ apparently no igneous ~~rocks as well as~~ nor conglomerates, rocks ~~are~~ observed ~~in the same stream beds~~ anywhere on the property.

In a general way the soil may be regarded as being fertile and capable of producing all the tropical farm and forest ~~are~~ crops. ~~Some of~~ the farm crops formerly planted in a small way ~~within~~ on the tract show remarkable development during the first two or three ~~ye~~ years, ~~subsequent to clearing the land and planting, thafter the~~ third year, but often the ~~many of the crops like~~ but such as cane and corn fail ~~unless vigorous steps are taken in conditioning the soil by supplying it with the proper constituents required for plant growth.~~ to develop properly. The squatters rarely resorts to measures that would render the soil on his clearing fit for continuous cropping, but prefers to make another clearings on nearby suitable areas on which he burns the brush and timber for the purpose of supplying a certain amont of ashes in order to destroy soil acidity. The bases such as calcium, potash, etc., are dissolved not only by cropping but even more so by the excessive rainy which leach the soil and carry away the bases leaving the soil deficient in neutralizing constituents.

Climate and Rainfall

Climate, rainfall, and drainage are conditions closely dependent one on another, The climate is, of course, of a purely tropical character with an average temperature of about 80 degrees F. There is, however, a considerable difference between the temperature of midday and

that of ~~the~~ the night ~~and the~~ or early morning hours before sunrise. This is true particularly of the more elevated parts of the interior, ~~of the property~~ where woolen blankets ~~are~~ may be required for sleeping during the night. During the winter (rainy) season the atmosphere is ~~exceedingly~~ rather humid ~~and often very oppressive~~.

no ¶ The rainy season ~~begins~~ commences during the month of ~~April or in early~~ May or June, and continues right through to about December ~~15~~ or January. During this period the streams are all flooded ~~and~~, and the dry stream beds of the summer season are converted at once into rushing torrents impeded only by their tortuous character. So heavy is the rainfall at times that the rivers rise as much as 10 feet within a few hours, and the water often on its way to the Immaculata carries with it ~~to the Bayano river and on down to the sea~~ numerous uprooted trees which render the use of the river exceedingly dangerous to ~~an~~ navigators. During the months of September ~~and October~~ ~~the floods on the bay and are so severe as to forbid even the daring Indians to venture a trip up or down its course.~~ long and there is often a very slight cessation in the rainfall and logs in the rivers may be moved down stream with comparative safety.

The moisture-laden winds are chiefly from the ~~east~~ north, which drive the rain clouds ~~westward along~~ southward against the southern slope of the Continental Divide. These winds impign on the southern slopes, which chill the clouds and cause the rain to fall excessively at the heads of the numerous streams draining into the ~~Bayano~~ Immaculata river. From December 15 to about the middle of April or first of May there is ~~an~~ almost ~~entire lack of~~ no rain throughout the region of the ~~Bayano~~ Warnecke river basin. The ground which during the rainy season is saturated, now ~~becomes exceedingly dry causing the surface to crack open so as to become a serious menace for horses and~~ becomes ~~cold~~ firm and oxen can be used ~~to travel over~~ in all parts of the ~~country~~ tract.

Population

It has been conservatively estimated that there are about 500 people living ~~along the banks of the Bayano river~~ chiefly in the towns of Chimán and Brujas and around; ~~probably about 125 are located within the property of the Company.~~ There are ~~no~~ very few settlers living away ~~or inland~~ from the ~~banks of the Bayano~~ coast or mouths of the river, ~~because of the lack of water during the dry season and the entire lack of means of communication.~~ The settlers are for the most part negroes either native born or from the British West Indian Islands. Their only pursuit is that of raising of ~~they of the~~ staple tropical farm ~~products~~ crops, such as rice, corn, cane, plantains, yucca, etc.; a few of the more industrious ~~negroes~~ settlers are engaged in raising cattle in a small way. There is, however, no attempt made anywhere along the river to ~~raise more~~ produce more than ~~that which~~ what is required for local consumption. ~~As a result of this there is a constant shortage in food supply.~~ The natives generally appear to be underfed and are not inclined industrially. As laborers in any local project they could not be relied upon; while they are all seeking employment when the opportunity offers they work a few days and then fail to report for duty for several days or even for several weeks. In a forest operation aiming at quantity production, labor from other parts would have to be introduced and consequently also all of the food supplies, which is one of the most series handicaps to a successful enterprise in this region.

Health Condition

As in all ~~countries~~ other regions with like conditions malaria is ~~in every family~~ common, and sooner or later every one living within the region will attract this dreaded ~~disease~~ ailment ~~as well as certain other endemic ailments such as the hook worm disease~~ which is so seriously decreases the vitality and efficiency of every native workman. However, under proper care and

diligence in the use of preventive measure it will be possible to avoid much ~~of~~ illness among the ~~workmen~~ laborers and others stationed on the property -

Means of Communication

There is ~~at~~ now no well-defined ~~crudum~~ route to the property, ~~from Panama~~. ~~The only~~ As already outlined, it is not feasible ~~way of reaching the tract~~ to attempt reaching the property by boat ~~is by boat from Panama City. An ordinary gasoline launch leaving La Marina, Panam City, will go to the mouth of the Bayano river in about three hours, a distance of 39 miles across Panama Bay. The distance from the mouth of the river to the tract is about 12 miles, which requires another three or four hours going up stream with the tide.~~ because of the numerous rapids. (from San Carlos) (up the Usumacinta River) can reach Chuman side 60 while there are no roads within ~~or near~~ the property. There are ~~not even any~~ trails ~~of any description whatever, and~~ travel through the forest ~~is~~ made ~~only~~ with great difficulty. The forest floor is ~~densely overgrown, while the crown cover above is open and admits abundant light as in all other dryland forests in which the bulk of the trees are deciduous as a result of the protracted dry season to which the forest type had to adjust itself. Travel is in most places difficult as a result of the rapid development of the profuse shrubby undergrowth.~~ is a trail leading from San Juan del Pozo within the property and can be only for the most part rather dense, for the cutting of trails before we can venture to pass over and demands horseback.

The Forest

In a general way the topography of the tract differs but little from that which obtains for the entire southern slope of ~~the interior broken highlands~~ Panama Republic, ~~except that in no part does the surface rise to an elevation of more than 1500 feet, and being located near the coast, it~~ This slope receives probably less rainfall than the region farther inland where precipitation is greater due to higher elevation. The forest here may be described as being semi-open, consisting of two stories, e. i., the low, useless, shrubby trees and vines ~~which are less conspicuous during the dry season of the year~~, and the large trees which ~~generally stand apart so that~~ have their crowns ~~rarely~~ interlock at the same plane above the ground. The trees forming this upper story alone yield merchant-

(Two very high and rocky ranges of hills to the Division on the Chorotega)

able timber, ~~and after barring the old, decrepit and otherwise useless specimens of any species, there are on an average not over five, or at most six trees to the acre, that an experienced~~ woodsman who knows tropical timber and forests, would include in his estimate. After excluding the large trees of such kinds that do not yield salable wood, like the light, spongy crepe, the number of trees large enough and suitable for saw logs are on an average surprisingly low considering the general density of the forest growth.

no ¶ Practically the entire area is covered with an unbroken forest which may be classified roughly into lowland and into upland types of forest; ~~the latter type includes~~ the forests on the upper slopes and on the ridges of the highest hills. The numerous low elevations under 500 feet have a forest growth that does not materially differ from that in the lowlands. Above the five hundred foot line the forest vegetation grades into a somewhat more open type in which the percentage of species different from that in the lowland.

Lowland Type

The lowland type of forest occupies approximately ~~90~~ 30 percent of the area of the tract. The term "lowland" does not imply that the land is permanently wet, though during the season of greatest rainfall the part along the streams ~~are~~ is often flooded and ~~when~~ the soil become ~~thoroughly~~ saturated. In this type mahogany ~~While the bulk of the~~ water flows back into the streams, as they become lower, much of the water passes through the top layer of sand and loam into the substratum of gravel leaving the surface layer exceedingly dry and hard during the summer season, when there are no rains. The soil bakes very hard and numerous deep fissures are caused by the excessive drying out of the soil. The vegetation consequently assumes

forms the major upland species

the character of a dryland forest as is shown by the presence of such trees like the almacigo which generally relegated to the middle or upper slopes of the dry or well-drained slopes and ridges of the highest hills. Many of the trees in this seemingly wet forest area are deciduous, which is another character indicating that excessive dryness prevails during a part of the year. At the same time the undergrowth is so impenetrable as to indicate that the upper story or crown cover is open and thus permits the light to pass through and to encourage the abundant development of the undergrowth, which is not the rule in a true rain forest where abundant soil moisture is present all the year round.

Thus, while the forest may seem exceedingly dense on first sight, a closer inspection of the crown cover and forest floor gives abundant evidence that enough of light is left through the crown cover to encourage the growth of vines, shrubs, and low useless forest trees or tree weeds, such as the numerous ingas, cecropias, membrillios, and a multitude of others of greater or lesser value. The intense struggle for existance in these river bottom or lowland areas is, therefore, not among the older trees, but among the seedling and the young and which have to compete with the low brush and the fast-growing kinds that generally overpower them. These trees of the better kinds that succeed in forcing their way through the dense undergrowth into the upper story, where light is sufficient for their further successful development, usually receive injuries or deformities which they bear through life and which fits them to withstand the wind and weather until they have attained maturity or merchantable sizes. A close examination of the dominant and overtopping trees now in the forest show that those which are now large enough to make suitable saw logs are in

reality defective in some manner or other, which minimizes their value for lumber purposes and greatly reduces the number of board feet such logs would otherwise have produced.

Singularly the useless or more or less undesirable species like the havillo, ceiba, crepo, pachira, Panama, rubber(jigo), almacigo, and numerous other softer or harder kinds are the least subject to the injuries incident to the growth and struggle for existance in the early stages of their development, because they are fast-growing trees and can soon shoot their tops through the dense undergrowth, and in the course of time become the dominant species of the forest before the usual damaging influences can inflict wounds or overpower them. A careful reconnoissance of these lowlands shows that about 40 percent of the total cut per acre consists of these soft wooded species for which there is at present no use either locally or abroad. The balance of the trees in the forest suitable for saw logs are slow growing species and all of them bear evidence of the intense struggle they passed through in early life, and are consequently defective and yield a surprisingly small a amount of sawn material of the upper grades that would pass the inspection authorized by consumers and dealers willing to pay a good price for stock s that are clear. The upper grades of lumber of almost any kind of wood will sell at a price, while the lower grades are sold almost invariably below the cost of production. A forest whose yield in upper grades of lumber is low is not regarded as a good investment at any price.

In the lowlands the logs of the espave trees may be said to yield approximately 60 percent of the total cut of the forest. However, upon close examination of the logs or stem of the standing trees, it will be seen that a majority of them are doty and otherwise defective. Many of the large trees that have fallen down in

the forest show large cavities in the center. There are very few seedlings or young espave trees in the forest, and the large and overmatured trees are gradually decreasing in number. When a large espave tree falls to the ground the open space resulting in the upper story of the forest is immediately occupied by fast growing useless varieties, such as the cecropias, ingas, balsa, havillo, membrillo, crepo, and ceiba, which goes to show that there is a tendency of the forest toward impoverishment and toward the development of low useless thicket growth. In other words the forest is in the process of slow decay, and there are already a number of smaller or larger areas within the lowland type of forest which appear to consist of a second growth forest of small useless species.

Upland Type

While there is a clear distinction between the character of the forest ~~on the river bottom or~~ of the lowland type and that ~~on~~ of the upland, this is not evidenced so much in the difference in the kinds of trees as in the difference in their occurrence, number, a and sizes. Here the espave, ceiba, corotu, fustic, amarillo, and numerous others are less plentiful, while the crepo, cocobolo, nuno(habillo), panama, almacigo, cedar sweet cedar(cedro espinoso), etc. are more abundant and often somewhat larger than the average of these species in the lowland forests. The rubber tree of all kinds, guayavo de monte, membrillo, jobo, crativo, and numerous other species are equally abundant in both types of forests. As a rule, however, the large trees on the upper slopes and on the ridges are of better timber form and it is generally believed that the woods grown here are better than in the lowlands. ~~However, as already outlined there is ix only about ten percent of the area~~

of the tract may be classified as upland. One of the reasons why the logs obtained from the uplands are of better form is that on the slopes, and especially on the very steep slopes the light can more easily penetrate the crown cover from the side and reach the relatively young trees and encourage their growth from youth u up, thus minimizing the struggle for light, and the result is that a greater proportion of the logs available are sound. The total yield of available lumber per acre is not larger, however, than on the lowland, because the majority of the large trees are crepe for which there is no known use and naturally would not be felled in a lumbering operation.

Forest Trees

The forests on the West Coast of Panama Republic do not contain so long a list of ~~important~~ tree species as might be expected. ~~As already stated the large trees are scattered and in no place do does one species predominate to the exclusion of all others. If the lumberman desires to procure the wood of only one or two kinds he is obliged to cover a large area from whichto draw his quoto of logs.~~ Besides the well-known cedar and mahogany in the Panama forests there are ~~very few~~ other kinds of timber that are generally util ized for lumber, ~~in any form~~.

no P

Among those ~~trees~~ which may be regarded as valuable by the ~~prospector, promoter, or the~~ lumberman are the following:

Espave (Anacardium rhinocarpus)

This is the most conspicuous timber tree in the lowland type of forest. It is the most easily ~~available~~ accessible tree, and because of its large size and often long, straight and cylindrical trunk, several attempts have been made to introduce the wood into the American markets ~~under various misnomers, such as espave mahogany or Panama mahogany~~. The tree is found in all parts of the tract

and it may be conservatively estimated that the average yield of espave lumber would approximate 4,000 feet per acre, while in some limited areas the yield might easily be double this amount. ~~The quality of the logs is such however that in actual practice of milling them the yield of firsts and seconds is surprisingly low. At the same time the quality of the wood even in the same log varies so much that even the most experienced grader would have a difficulty in sorting the boards so that no serious dispute would arise with reference to the character of the inspection. Further data will be given in another part of this report.~~

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Cedro Espinso (Bombacopsis fendleri)

This is the so-called spiny cedar, or the pochote of Costa Rica and the zaquisaqui of Venezuela. The trees are large and usually sound, and the wood relatively soft and easily worked. It has, however, an excessive amount of latent moisture, and unless special methods can be devised for drying the wood effectively and speedily it can not be sold in the American markets. The tree ~~is not plentiful anymore; there are some trees of this species on the uplands. The wood is not a cedar at all and could not be sold as such, for it has no odor.~~ occurs sparingly throughout the country and may yield about 2000 board feet per acre. ~~and~~

Nuna (Hura crepitans)

This is the sand box tree of the British West Indies and the possum wood of Dutch Guiana. In Panama it is sometimes called cedro blanco, but this is a misnomer for it does not belong to the cedars. ~~It seems that~~ the nuna trees are found chiefly on the upland where some of the ~~trees~~ are very large. The natives prefer this species for making their dugouts, when the wish to build one for carrying large cargoes. ~~This wood is now being brought into the United States from Dutch Guiana, but the buyers are not interested in trying further shipments.~~

Ceiba(Ceiba pentandra)

The ceiba is better known as the silk-cotton tree. It is by far the largest tree in the West Indies and produces large boles that are sometimes 40 feet to the first branch and sometimes more than eight feet through above the root swelling. That the ceiba is one of the most generally distributed tree in the West Indies is well-known ~~and yet is not utilized anywhere within its range of growth, is possibly proof enough that its wood is not likely to be requisitioned in the United States for many years to come.~~ However, the wood bears a more or less close resemblance to that of white pine and ~~which~~ has attracted the attention of a good many travelers in tropical America. The ceiba tree is scattered throughout the tract, but the average yield would probably not exceed 500 ft. per acre.

Crepo(Cavanallisia sp.)

The crepo is the most conspicuous tree in the forest, especially on the upper slopes and and ridges of the low hills. It is very abundant and the trunks are for the most part exceedingly massive and cylindrical to the top usually overtopping all other ~~t~~ trees in the forest. As is well known the wood is exceedingly soft and therefore easily worked ~~and spongy and very perishable. It has no uses and could not be placed on the market except at a prohibited cost due to the great danger of staining and becoming worm eaten.~~ While the yield in board feet per acre for crepo would be very great no attempt has been made to estimate the quantity, for the reason that the wood ~~is in no manner available.~~ has at present no known uses.

Cocobolo(Dalbergia sp.)

Cocobolo is one of the commercial woods of Panama, for it is one of the rosewoods ~~that enter~~ used extensively in the American markets. The tree is pretty generally distributed over the uplands and especially

on the upper slopes of the hills ~~where the trees gain sufficient sunlight for their best development.~~ The trees often attain a trunk diameter of more than 30 inches and a clear length of 36 ft. It is the heart wood alone that is merchantable and only the old mature tree have the heart sufficiently developed for use. For this reason only a small proportion of the trees could be cut for the market.. The average yield of lumber would probably not exceed 300 ~~250~~ feet per acre.

Coratu(Enterolobium cyclocarpum)

Coratu is possibly the best wood on the tract for a great many uses, ~~but the trees are very scarce. It is not believed that~~ there is about ~~are more than~~ one tree to every ~~five~~ acres, and many of the very large ~~are old and decrepit.~~ It is quite likely that this species was at one time one of the predominating kinds, ~~but like that of the caspve is doing now, it is gradually dieing out, and the forest generally is becoming a low scrub area in the course of several centuries.~~

Guayavo de monte(Myrtus sp.)

This is one of the conspicuous trees in the forest. It is easily recognized by its pale smooth bark and the slightly ~~gr~~ groved trunk. The wood is exceedingly close-grained, hard, strong, and durable, but is prone to splitting in seasoning. It is also one of the most plentiful trees on the tract, ~~but there is very little use made of it anywhere within its range of growth.~~ Owing to the irregular growth of the trunks which are often very long to the first branches, the yield in board feet is relatively ~~would be very~~ low in an actual operation. The average yield per acre does not ~~would not~~ exceed 30 ~~250~~ feet.

Jobo(Spondias lutea)

The jobo is one of the common timber trees on the tract.

It produces a relatively soft though fairly tough wood that has not come into general use. It is plentiful throughout the tropics and the trees are as a rule fairly large and the trunks develop into good sizes which remotely resemble the American ash. The bulk of the trees in the forest are from 15 to 20 inches in diameter and upward to 24 feet to the first branches. They attain their best development on the lower slopes where there is sufficient moisture in the soil. The average yield per acre does not exceed 500 board feet.

Other Woods

There is a relatively long list of other woods which help to make up the forest, but ~~which~~ such trees are ~~so~~ nevertheless scattered ~~either evenly~~ sometimes or in clumps; ~~that~~ they are not deemed important enough to mention here. The cativo, maria, nispero, fustic, membrillo, amarillo, panama, caimito, almendra, etc., etc., are all met with frequently, and it may be safe to say that in the aggregate these would yield ~~another~~ 500 board feet to the acre.

Total Quantities of Timber Available

The quantities of the different kinds of timber available on the tract are approximately as follows:

Kinds	Amount in Bd.Ft.
Espave	4,000 bd. ft. per acre.
Nuna	~~250~~ " " " "
Ceiba	500 " " " "
Cocobolo	300 ~~250~~ " " " "
Guayabo	250 " " " "
Jobo	500 " " " "
All others	500 " " " "
Total	5,250 " " " "

Approximate Stumpage Value

While it is difficult to appraise standing timber in the tropics without any reference to past sales made of similar woods on the stump and under like conditions, it is believed that in view of the rapidly growing

vanishing hardwood forest resources ~~advancing stumpage values~~ in the United States and the unusual interest shown by ~~large~~ hardwood operators in tropical timber lands, a nominal price of $1,00 per thousand feet of standing timber on the tract could not be regarded as excessive. The conservative estimate of ~~5,250~~ Chiapas profile board feet of available timber per acre on the ~~tract would therefore place the timber value at $5.25 per acre, or the entire tract would have a total value of approximately one-half million dollars exclusive of the land.~~ 7.84 sold

assumed by the tract owned

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the number calculated from the conservative figures above tabulated is —, or — board feet per acre!

Feasibility of operating

Although the quantity of timber in the form of good sizeable saw logs is large and sufficient on this tract for an operation extending over a period of years, the conditions that are hinging on a venture of this kind are such as to discourage the undertaking at this time. One of the main reasons is that there are insufficient requirements locally for these woods to warrent cutting large quantities into all grades of lumber. While a number of them are well-known in Panama, there are too few industries calling regularly for the different kinds and in quantities that would justify the cutting of all the logs as they are coming out of the forest. At present there is a local demand mainly for cedar, mahogany, and for smaller quantities of cocobolo, roble, almendra, etc., Since there is no mahogany and very little cedar on the tract, the operation would be concerned mainly in cutting the lesser valuable woods for which the outlet would not be large enough to justify the establishment od a sizeable mill and the expectation of a continuous operation.

There are at present only a few small saw mills in operation in the Republic of Panama, and these are working only on part time, indicating that there is a very limited demand for local lumber. A mill not in operation is an expensive proposition, and un-

7850
7850
86,350,000

7850
110,000
00

785
110000
7850000
785
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less it is possible to keep the plant busy the year round, it will be a losing business from the start. Although the log supply is definitely assured, this will afford no encouragement unless an outlet for the lumber is equally certain, and it does not seem that there is a sufficiently large demand for the lumber either locally or abroad to launch a venture involving such a large outlay of capital without an assurance of a return. If the enterprise is started on a small scale, it can not be expected to yield large returns. In fact the existing mills have the advantage, because they are cutting only such woods for which there is some call locally, and moreover these mill operators are buying only such logs which have been especially selected in the wood, and from which a much larger proportion of high grade of lumber can be cut than from the general run of logs of all kinds and grades of logs which would milled in a clear cutting operation.

The proposition would be greatly simplified, if the tract had a good quantity of mahogany and cedar, for then it would be possible to export them and include regularly in the shipments parcels of other woods to try out in the foreign markets, which would eventually be accepted for special lines of manufacture and at a price fair to the millman. Dealers eager to procure mahogany would accept at times these small parcels of other woods on a gamble and finally sell them. But to make a smaller or larger shipment of these little-known kinds now, either in the log or in the form of lumber, even if cut according to the American standard grades, would result in an almost total loss, because American wood users will not accept new woods in place of those they have been requisitioning except at prices that are very low. Mahogany buyers require ten feet of other woods to every foot of mahogany,

they buy, and these buyers can best be reached through the mahogany dealers, who may take in new woods, if they will receive a certain proportion of mahogany.

Thus, the chief obstacle in a venture in which cedar and mahogany do not play an important part in the production, is the fact that there is not immediate outlet for the product of the mill. The quick sales of a sawmill is what makes it possible to turn the capital back into the operation and make another profit on the investment. The profits are in most instances small, but the mills that are being kept running all year round usually make their profit on the frequent turns of their capital and on the bulk that is turned out yearly. The cost of the operation is cut down to a minimum and the output is increased to a maximum to meet the sharpest competition. It is difficult, therefore, to cut these tropical woods into similar dimensions, ship them to the United States, and there compete with lumber that is sold at highly competitive prices which are now prevailing. For this reason the American producers of lumber can in many instances deliver sawn and dressed lumber to Panam or any other tropical American port for much less than for what the local producers can supply their most common grades . Therefore, if the American timber stands in competition with that produced locally in Panama, how much more will this be the case with Panama timber in the North American markets.

The question now arises as to why the American sawmill man is seeking opportunities in the tropics. This can best be explained on the basis already alluded to above. There is a distinct demand for the better grades of the well-established woods such as cedar and mahogany that have risen in prices. These woods have no competitors in the United States markets which are absorbing annu-

ally over 100,000,000 fett of high quality grades, and in turn are exporting approximately 40 times as much of the lower grades of our domestic kinds of which they have an excess, and which they can produce at a figure far below the price at which the foreign woods can be bought and sold for in the United States.

It is a question, therefore, of a demand for quality and quantity of known kinds, and if Panama had a good quantity of cedar and mahogany, it would constitute an attractive proposition to American importers and dealers, because it is believed that with these woods as the major product on which a profit could be made, the mill could be kept running continuously and the cost of operation so reduced on the unit measure that a good many, if not all, of the little known woods could be turned into lumber and shipped to foreign markets in competition with other and better known woods.

In conclusion and at the risk of repeating what has alre ready said or implied above it is difficult to understand how a successful lumbering operating on the Bayano river could be made possible at this time when all the factors on which the enterprise hinges are so discouraging to those who know conditions best. Upon reviewing the conditions that may be regarded as favorable in a logging and lumbering venture in the United States, and comparing them with those that obtain in any proposed operation on the Bayano river, it will be observed that the possibilities for success in the latter is not only small but practically wanting. If is not labor difficulties, it is the weather, market, or some other condition, avoidable or unavoidable, that will nulify the most conscientious endeavors on the part of the management, as is evidenced by the wrecks of former unsuccessful ventures. While it is

reasonably certain that any attempt to operate on the Bayano river would come to an early grief, it need not be credited to any one of the conditions above referred to or implied, for there are abundant reasons for such a predicted failure in the material itself. To those who have a thorough knowledge of the woods growing along the Bayano river, know the characteroff the forest, and are familiar with the market conditions and the requirements of the wood users in the United States, it does not seem adviseable to launch a logging and milling operation at this time, for it is not believed that a sufficient quantity of lumber or logs can be marketed to make the venture a feasible one.

Mr. Ernest R. Weakes, Panama, stated in an article entitled "Modern Gold-Mining in the Darien" (Trans. of the Amer. Institute of Mining Engineers, Vol.,29, Feb.1899--Sept. 1899,inclusive pp 249---280) that "Every yard of the country may be said to be covered with forest. However, not 50percent of the trees are fit for making lumber, and probably 25 percent are not even good enough for firewood."

Further on in this article which relates to the same general conditions as are found on the Bayano the author states that "Some of the hardwoods make beautiful lumber, and appear to be varieties of fustic, bullet-wood, nispero, and wild guava, with occasionally a species of mahogany, of which the battery-posts in the mill are constructed. Hardly any of the woods will float in water. Cedar is now getting scarce, and is used for the finer classes of work only.

The old Spanish mine-timbers, which were found in such perfectipnesservation, were chiefly of mapurri, which is now so scarce, and is never found of any size. The segments of the Span-

ish whells were made of ispabe, andenormous tree, a sort of bastard white cedar, which it much resembles in growth. It is plentiful and useful for rough boards. It was probably chosen by the Spaniards on account of its size and the ease with which it can be worked up."

The Truth about Espave

~~After all the defective and otherwise useless logs are excluded there is very little left except espave from which to chose. According to the liberal estimate made on page 17 of this report about 3/5 of the available wood is espave, but in actual practice it would probably be more than 4/5. And~~ To the northern traveler in Central America the espave tree is usually an impressive one; its enormous size, long, straight, and cylindrical trunk, its proximity to the streams, and its great abundance in all the low lands are features that appeal to some seeking investment in tropical America. A number of promoters and others in times past advanced large sums of money to exploit espave, and there is probably no other tree in tropical America producing more wood per acre than the espave, and those who are not familiar with the kinds of timber required in the large markets can not understand why logs like those they see standing in the forest of Panama or Costa Rica can not bring fancy prices in the northern markets.

A number of trial shipments of espave logs have been made to the United States, and in nearly every instance the importers unwisely classified the wood upon its arrival at destination as a cedar or mahogany. In fact, the tree is often incorrectly called espave mahogany in parts of Panama, though it is not related to the family producing mahogany, but this name has been adapted for the purpose of interesting prospective buyers of tim-

ber lands. There are a number of tracts in Panama that have frequently changed ownership, and in some instances the purchasers were under the impression that they acquired property with immense quantities of mahogany of mahogany and mahogany-like woods.

Dealers in foreign hardwoods and others familiar with the tropical American forests receive a number of requests for information as to the present or possible future value of this wood in the American markets. The question is a difficult one and can not be answered satisfactorily to all concerned. It must be said, however, that at present there is no market for this wood, and it would be a formidable undertaking to find a use for it now. Some of our native hardwoods were considered 30 years ago as almost useless, but today they are in great request, and the same perhaps may be said of espave some day. A few facts relative to the character, growth, and distribution of the tree and the nature and local uses of the wood may be of value to those interested in espave from an investment point of view, and from these can possibly draw their own conclusions.

Espave or espavel belongs to the cashew family of plants and is botanically known as Anacardium rhinocarpus. One of the unfortunate trade names of the wood of this tree is bay mahogany, but it must not be confused with the softer grades of true mahogany obtained in the lowlands of Mexico, which is also called bay mahogany. It is occasionally referred to as false or espave mahogany, Pasega mahogany, or Panama mahogany. In western Venezuela, where this tree grows very abundantly, it is commonly known as caracoli or acajou. The English speaking people in the region where this tree is found cal it the giant cashew tree, because it is one of the largest and most familiar trees; the fruit resembles very closely that of the true cashew or maranon tree which was into

troduced into tropical America from India.

To indicate to a prospective buyer that this wood is a "mohagany", or that it is a cross between a cedar and mahogany is indeed a great mistake, for its relation to any of the trees in the family producing the mahogany wood of commerce is no closer than that of our American sumack. Nor can the espave be classified as a cedar, and any attempt on the part of the trade or individual to pass it under the highly improper names of cedar or mahogany will only add to the already formidable task of introducing the wood in to the American markets.

The espave is found abundantly throughout Central America, Colombia, and Venezuela. It finds its best development in Costa Rica and Panam along the rivers and in low moist soil on the west or south side of the Continental Divide, but it occurs occasionally also at an elevation of about 2,000 feet. While it has been reported by some promoters that in some locations along the Bayano river the yield is from 20,000 to 40,000 feet per acre, this is a gross exaggreation.

The tree occurs chiefly in the dense forests where it frequently attains a height of 100 feet and a diameter of three or four feet near the ground, The trunks form straight, cylindrical columns which are often without branches for 20 or 40 feet. The espave is an evergreen tree which is easily recognized in the forest by its cinnamon brown bark which is more or less coarse like our white oak. The leaves are large, oblong, and somewhat leathery. The fruit is kidney shaped and is edible. The inner bark yields a milky juice which becomes hard and black as it dries and is used sometimes for making vernish.

The wood is moderately soft and light in weight, weak, and prone to warp, check and shrink. The cross-grained character of the wood often renders it very difficult to work, and is suit-

able only for common boards in the rough. The color does not run uniform even within the same log, and even the choisest material wo would not appeal to the American wood user.

Agricultural Possibilities

It has already been pointed out under the subject of soil and also under climate and rainfall that the area along the Bayano river is not ideal for agricultural crops. While bananas could be grown here very satisfactorily, it is quite evident that they could not be placed on the market in competition with those grown on the east coast where every condition is far more favorable. Steamers would not pass through the canal for bananas, and to bring them by other means to Cristobal for loading would entail too much handling charges. There are however, a good many other reasons why a banana plantation would not pay on the Bayano river. Nor is the writer of the opinion that cane could be grown at a profit here at this time. It is not believed that the timber obtained by clearing the land would be sufficient valuable to pay for the cutting of the brush, burning it and planting the cane.

The writer is of the opinion that it would be highly inadvisable for the company to make another venture on the tract, which would involve the outlay of much additional capital. It must be borne in mind that the information disseminated by promoters and would be experts in regard to the agricultural possibilities here and in regard to the Centarl American forests resources, their accessibility, vastness, richness, and wealth in fine and inexhaustible supply of timber has been greatly exaggerated and has already led to many investments and to the formation of innumerable enterprises among which the first one has yet to prove successful.

Conclusions

1. The region in which the tract is located is not easily accessible.

2. The country is without roads suitable for hauling logs.

3. The streams are too small and meandering for floating the logs; during the dry season there is no water in the interior of the property.

4. Labor is scarce and inefficient,

5. Food for the crews as well as all equipment would have to be brought from the United States.

6. There is an insufficient quantity of good quality timber on the tract to warrent the construction of a logging rail road and the installation of modron logging equipment.

7. There is practically no timber on the tract that can be successfully exploited and the lumber placed on the local or American markets in competition with our pines and hardwoods.

8. It seems highly inadviseable to clear the land and plant cane or bananas at this time.